19. $s(t)=t^2-3t+2$

a) $s(5)-s(0) = 10\text{ m}$

b) $\frac{s(5)-s(0)}{5-0} = 2\ \frac{m}{s}$

c) $s'(t)= 2t-3\Big|_{t=4} = 5\ \frac{m}{s}$

d) $2\ \frac{m}{s^2}$

e) $2t-3=0 \quad t=\frac{3}{2}$

v – – 0 +

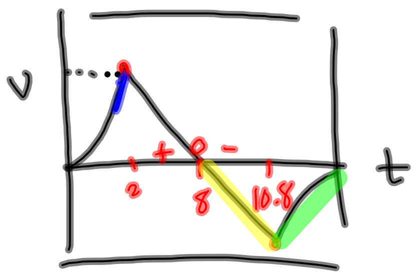
0 $3/2$

change direction at $t=3/2$
because v changed sign

f) min at $t=3/2$ (furthest left) min is $s(\frac{3}{2})=-.25$

Sep 20-7:42 AM

18.



a) 190 ft/sec

b) 2 sec

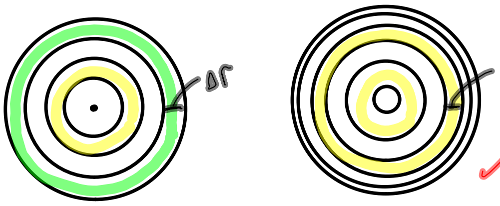
c) at $t=8$ $v=0$

d) 2.8 sec

e) $t=2$ $(2,10.8)$

Sep 20-7:52 AM

3.4b Other rates of change



I Δr constant

II

✓ ΔA constant

Δr gets smaller

Which is the more appropriate model for tree growth, I or II?

✓Area of the rings should be the same
constant

circle

$$A = \pi r^2$$

$$\frac{dA}{dr} = 2\pi r$$

$$\frac{\Delta A}{\Delta r} \approx 2\pi r$$

$$\Delta A \approx 2\pi r \, \Delta r$$

constant

slope of tan

slope of secant

$$\frac{dA}{dr} \approx \frac{\Delta A}{\Delta r}$$

change in A

change in r

inst. rate

ave rate

Sep 20-5:53 PM

Ex 6 p 133 Sensitivity to change in genetics

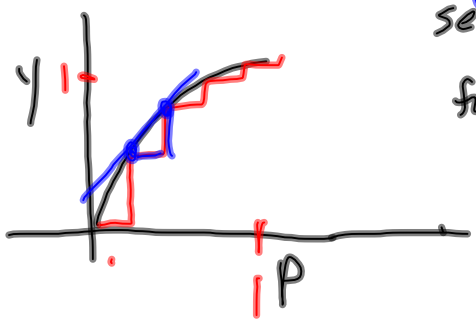
p=proportion of a dominant gene in a population
1-p=proportion of the recessive gene
y=proportion of dominant gene in the next generation

y = 2p-p^2

Compare the graphs`of y and dy/dp to determine what values of y are more sensitive to a change in p

(steep)
sensitive to change

for a given Δp you get a big Δy



$$\frac{\Delta y}{\Delta p} \approx \frac{dy}{dp}$$

Sep 20-6:14 PM

Derivatives in economics

derivative = "marginal"

Ex 7 p 134 Marginal cost and marginal revenue

c = cost (total) x = # rad.

r = revenue

$c(x) = x^3 - 6x^2 + 15x$

$r(x) = x^3 - 3x^2 + 12x$

marginal cost $= c'(x) = 3x^2 - 12x + 15$

$c'(10) = 3 \cdot 10^2 - 12 \cdot 10 + 15 = \$195$

marginal revenue $r'(x) = 3x^2 - 6x + 12$

$r'(10) = 3 \cdot 10^2 - 6 \cdot 10 + 12 = \$252$

$c' = \frac{dc}{dx} \approx \frac{\Delta c}{\Delta x} = \Delta c$ if $\Delta x = 1$

marginal cost $\approx$ cost of the ~~next~~ radiator

$\Delta c \approx \frac{dc}{dx}$

marginal revenue $\approx$ revenue for the next radiator

$\Delta c = c(11) - c(10)$

Sep 20-6:37 PM